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Is Newton's Theory of Gravitation Tenable?



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Being engaged in the milling and grain trade, I have taken a great interest in, and pursued many lines of investigation into the causes of the yearly fluctuation in grain yields, and the cycles which they apparently follow. In a number of scientific essays, I have noted attempts to correlate sun spots with mercantile panics, or industrial conditions, or sun spots with meteorological disturbances, or auroras with other phenomena. I can find a large number of coincidences, sufficient to give the best reasons for believing that when science has penetrated further into the undiscovered domain, one great causation theory will lay bare the secrets of nature and will allow man to forecast future cycles with as much confidence as he can plot past cycles from known data. Price fluctuations on the great commercial exchanges, for well known reasons, are connected with barometric pressure and rainfall curves. By my own observation I have noticed variations in the acreage yield of corn, closely following the earthquake years. Earthquake specialists also have shown that years, or geological epochs of great earthquake activity are accompanied by the greatest growth of vegetation, and epochs of sparsity of plant life are void of earthquake or volcanic eruptions, so that the fluctuation of the grain prices may furnish, if properly interpreted, a better seismological record than the seismographs located at our great universities or government scientific stations. These observations led me to observe a wide range of physical phenomena and everywhere I see the forces of nature working not uniformly, but in cycles, for example, sun spots, solar heat, nutation, plant growth, earthquake, barometric pressure, magnetic variations, procession of equinoxes, thermometric measure-

ments, heat, solar radiation, etc., etc. In fact in the whole range of nature, there is **not one constant force**, no one that does not move in cycles or vary.

The question then occurred to me, **How then if all known forces are subject to fluctuations, could gravitation as promulgated by Newton be constant?**

Newton's whole theory is limited and closely confined by his Regula or rule III, page 2, book 3, volume 11, Newton's Principia, concerning the System of the World, which translated reads thus: "The qualities of bodies, which admit of neither **intension** or **remission** of degrees, and which are found to belong to all bodies within the reach of our experiments are to be esteemed the universal qualities of all bodies whatsoever." This is the definition and the essential of the entire theory. The whole system of modern mathematical astronomy rests upon the **constancy** of gravitation. If gravitation is a varying quantity then the whole series of calculation of the **mass** and **density** of the heavenly bodies is erroneous.

Further, if gravitation is constant, how can it be explained that a constant force can produce a fluctuating result, such as is evidenced in the hitherto enumerated cyclical phenomena.

It seems to me that Newton's conception of the character of gravitation is wrong.

I. Physically.

II. Mathematically.

III. Misleading in its applications.

I. Physically.

Newton considered gravitation a **property** of, and **inherent** in matter. If it were such then it would be constant. If it were not constant, then the force would be a state or condition of matter depending upon the physical condition or chemical forces by which it was then influenced, and gravitation would have to be sought for among forces not yet discovered. Maske-

lyne's Schehallien experiment or Cavendish's balls are not crucial tests and may prove attraction but nothing for or against Newton's materialistic conceptions or the variations of attractions due to causes other than Newton's mass.

A disproof of the constancy of gravitation will disprove Newton.

Sir John Herschell remarks: "The Newtonian theory is not sufficient to explain all the movements of the heavenly bodies."

J. J. Thompson in "Electricity and Matter", Silliman Lectures, Aug., 1903, page 51, says: "It might be objected that since the mass has to be carried along by the Faraday tubes and since the disposition of these depends upon the relative position of the electrified bodies, the mass of a collection of a number of positively and negatively electrified bodies would be constantly changing with the positions of these bodies, and thus that mass instead of being, as observation and experience have shown, constant to a very high degree of approximation, should vary with changes in the physical or chemical state of the body."

Dr. Gustave Le Bon on page 30, "The Evolution of Forces", 1909, says: "Not only does the mass vary with the velocity, but it has lately become a question whether it does not also vary with the temperature. The question has not yet been elucidated. However that may be, mass is not at all that invariable magnitude which chemistry and mechanics formerly supposed it to be. The element which science considered as the immovable pivot of phenomena, the starting point to which it endeavored to refer all things, has become a variable magnitude of which the apparent fixity was only due to the imperfection of our means of observation."

Earthquakes (Hobbs), page 303: "The earliest modern determinations of gravity within the oceanic areas were made upon islands situated far from the mainland of Asia. The results obtained were so abnormal as to allow the conclusion that gravity is generally above the normal value over the seas and below

it upon the continents. Thus it became common to speak of continental and insular values of gravity."

Same page 305: "As has been found to be the case on the land, the points of maximum **abnormal** gravity upon the sea are the zones of **extreme instability**.

Same page 302: "Fig 110, map of southern Italy and Sicily, to show the distribution of variations in the value of gravity." (after Ricco).

Intra-atomic energy. Gustave Le Bon, Smithsonian Report, 1903, page 291: "We never find in a chemical combination the total weight of the bodies employed to produce that combination."

Same, footnote. Landwolt and Heydweiler have weighed numerous bodies before and after the action of chemical changes which those bodies set up, and announce that the weight is not the same before and after the reaction."

"Sulphate of copper in water is not the exact sum of the weight of the salt and the water."

Some unrecognized Laws of Nature by Ignatius Singer, page 404. "A platinum crucible, when weighed hot, weighs less by several mgrs. than when cold."

"Two brass weights of 100 grammes each were placed in the two pans of a balance which turned with a tenth of a mgr., and were carefully equipoised. Then one of them was placed for half an hour in a water oven. When replaced on the balance it weighed as nearly as we could determine ten mgrs. less."

Page 407. "A supersaturated solution of sodium hypo-sulphite was obtained by dissolving three parts by weight of the salt in one part of hot water, and allowing it to cool. The glass-stoppered flask was then placed on the balance and weighed along with a small crystal of the same salt. By now dropping the crystal into the solution, crystallization set in, and although the weight of solution, flask, and all, did not exceed 60 grammes and the difference of temperature before and after crystallization was not more than 20 degrees

C. at the utmost, the difference in weight amounted to 25 mgr."

"A glass tube sealed at one end was contracted in the middle. In the lower portion was placed about 10 c.c. of water, and in the upper portion a stick of dry potassium hydrate of about equal weight, and the tube was sealed. After cooling, the tube was weighed, and then turned upside down, so that the water could flow on to the potassium hydrate. The stick of potassium hydrate partially dissolved and the solution crystallized. On weighing it was found to be lighter by about 20 mgr. On shaking the glass the crystals partially redissolved, and the tube became heavier; but after some time the crystals reformed, and the tube weighed again less."

A very interesting calculation can be made showing the parallelism between gravity and heat. The first law of Thermodynamics is that heat and mechanical energy are mutually convertible, and that heat requires for its production, and produces by its disappearance, mechanical energy in the proportion of 772 foot pounds for each British unit of heat. The said unit being the amount of heat required to raise one pound of liquid water by one degree of Fahrenheit near the maximum density of water. One cubic foot of water at 39.1 degrees weighs 62,425 pounds. One pound of water then contains 27,681 cubic inches or a cube whose dimensions are 3.025 inches. One square foot of water then contains 15.74 small cubes of water to a depth of 3.025 inches. 39.1 degrees Fehrenheit represents 502.5 degrees above zero degrees absolute. One foot of surface then represents 502.5 times 772 times 15.74 divided by 33000 or **185 horse power** per square foot surface of the earth.

We cannot measure the horse power of the pressure of the air upon the earth, but presuming that the air pressure is 15 pounds per square inch it will balance a column of water 34.6 feet in height. By hydraulics this head of water, one foot square, would furnish **184.5 horse power**. A certainly close coincidence. Barometric pressure decreases with height, so does

temperature. Diurnal oscillation of the barometer follows diurnal oscillation of the thermometer. The relationship between heat and gravity is certainly clearly defined. They are off-spring of the same parent.

I might remark in passing that solar radiation of one-ninth horse power per square foot acting continuously is certainly doing a noble work in keeping up the temperature of the earth continuously to 185 horse power. Learned scientists of A. D., 2000, will prove distinctively by the calculus of the fourth dimension that the planets may be heating the sun.

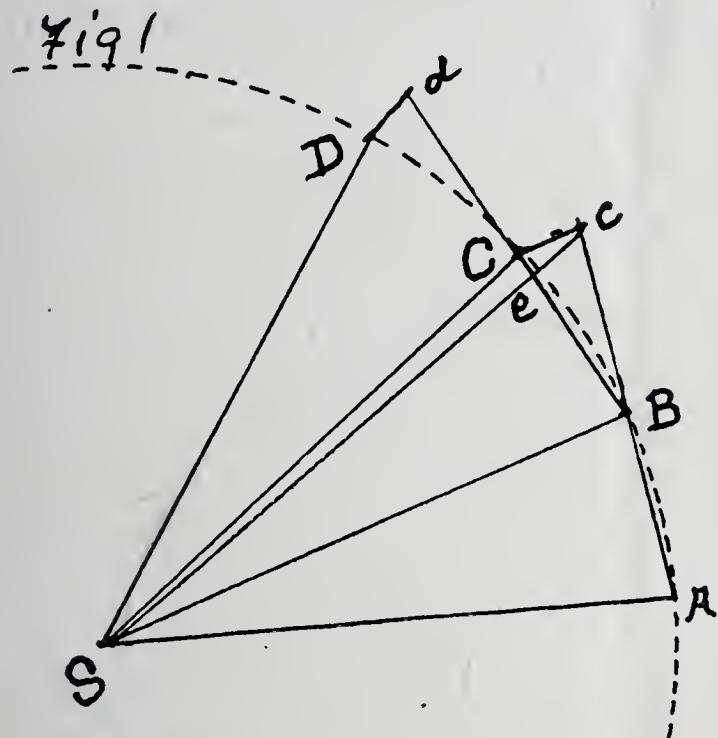
This variation in the weight due to the chemical or physical conditions of the bodies can be indefinitely extended, but the above few examples will be sufficient to show that there is some substantial reasons for disbelieving that gravitation is as constant a force as the believers in Newton would wish it to be, and would tend to prove that gravitation is not a **property** but a **state of matter** or may be only incidently connected with matter.

II. Mathematically.

Newton's first application of his theory of gravitation was to the solution of Kepler's first law that "The radius vector of every planet describes about the sun equal areas in equal times." The mathematical demonstration was embodied in the following: **When a body moves in a curve** acted on by a force tending to a fixed point, the area which it describes by radii drawn to the center of force are in a constant plane, and are proportional to the times.

The demonstration of this theorem is similar in all works on astronomy, and the small but finite space, which is the crucial test of the solution of the theorem

is ignored. It is on this finite space C e that I rely in opposing the accuracy of the accepted solution.



Assuming A, B, C, D, S, to be the segment of a circle with the sun S, as the fixed point, with A, a body body traveling from A to B, with a fixed velocity per minute. The second minute it would travel to c were it unsolicited by the sun, in a straight line Ac. The area ASB would be equal to

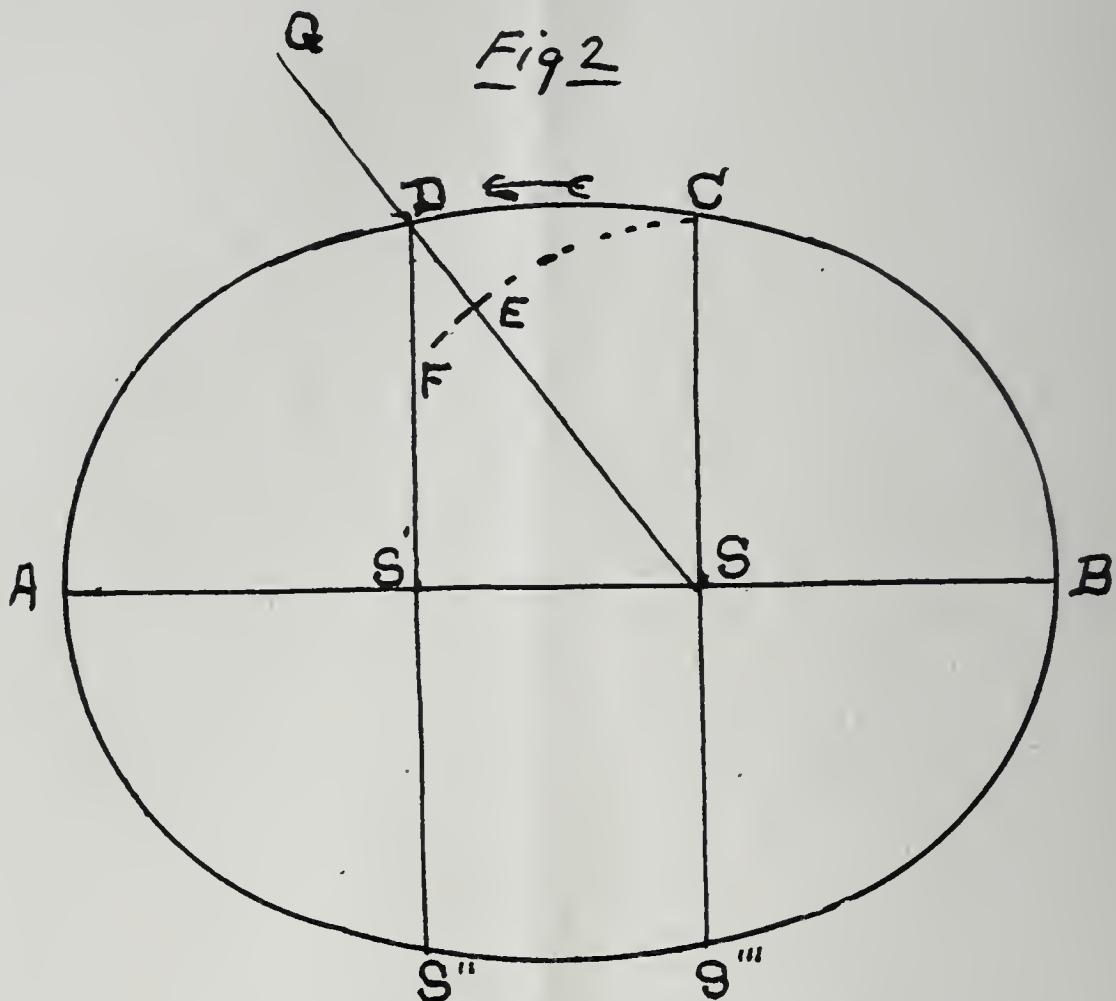
S B c But the sun's attraction is acting at an acute angle ScB, consequently at the end of the second minute the planet would be found at e and not at C and the area SeB would be less than the area S B c—S B C—S B A— so that the sun's attraction would act as a retardng force C e. Each successive area becoming smaller and the orbit of the planet assuming the orbit of a spiral having its ultimate end in the sun.

The retardation each minute of time, being the velocity times the versed sine of the central angle subtended. It is true the retardation is exceedingly small but it is not negligible. The deflection of the earth is 72 feet per minute. Six sextillion tons moved 72 feet per minute represents work, and that work being part of the arrested momentum of the projectile velocity, would ultimately destroy the entire projectile force.

This deflection and retardation is the ground work upon which will be based the true explanation of the phases of **cometary bodies**, which have not as yet and never will yield their secrets to Newtonian solicitations.

Newton assumes a projectile force. By denying

the constancy of gravitation, such assumption is unnecessary, and that assumed force can readily be found. Newton also assumed the central gravitation to be acting by momentary impulses. This assumption is not justified by the laws of mechanics.



Let fig 2 represent the earth orbit:

The greatest distance ...SA equals 92,963,000 miles
 Least distanceSB equals 89,897,000 miles
 Major axisAB equals 182,860,000 miles
 Semi latus rectumCS equals 91,404,489 miles
 DS equals 91,455,510 miles
 DE equals 51,021 miles

Were the earth acted upon by a constant force, when it arrived at C, the orbit would assume the path CE whose radius SE is equal to SC, but the orbit passes through D, hence the earth's attraction is lessened by a force capable of pulling or pushing the earth from D to E or DS minus ES or CS which is 51,021 miles.

These figures are only approximately correct as I

have omitted several small distances as E F and the variable speed of the earth as not effecting the validity of the conclusion I wish to draw.

The earth in traveling from C to D, a distance of 3066000 miles at an hourly velocity of 68288 miles, will consume 44.9 hours or 161640 seconds.

Then in 161640 seconds the earth will be deflected D E a distance of 51021 miles or 269390880 feet.

Applying the formula $S = \frac{1}{2}gt^2$ we find $\frac{1}{2}g$ equals .01031 or g equals .02064.

But g or .02064 in acting over a space of 92,963,000 miles is of less intensity than if the action were confined to the 3066000 or the focal distance, on the same principal as a ball rolling down an inclined plane. Were the action confined alone to the distance 3066000 miles the intensity of g would be 30.3 times .02064 or .624, which would represent g when applied to 3066000 miles. In other words, the force of gravity has decreased .02064 to produce the elliptical orbit, and this differential decrease is continued to A or apelion. Apply the formula $V = gt$ to a body falling from S' to S or S'' to S''' which would be the same as the velocity of a body projected from S to S' under a gravity of .6254. The approximate time of the earth in traveling 3066000 miles is 68288 miles per hour or 44.9 hours or 161,690 seconds. Substituting we have $V = .6254 \times 161,640$ or 100,090 feet per second or 68,243 miles per hour, or 45 miles less than the earth's hourly velocity, a difference of .0006.

So we see that the orbital velocity is dependent upon the differential decrease of gravity of the planet and the original projectile force of Newton and Laplace is accounted for. So it readily follows that the orbital velocity regulates the distance from the sun as is pointed out by Kepler's third law and regulated by the central attraction, whose influence is exerted by the rule of inverse squares.

At first reading, it may appear that I am reasoning in a circle, but a little further study will show that I am not.

Sir Robert S. Ball in the "Cause of an ice Age"

page 90 says: "Of the total amount of heat received from the sun on a hemisphere of the earth in the course of a year, sixty-three per cent. is received during the summer and thirty-seven per cent. is received during the winter."

In the northern hemisphere we have a summer of 186 days, and a winter of 179 days, thus giving the earth more radiant heat during the summer than the winter. A paragraph which confirms the levitating qualities of heat, when compared with my previous arguments.

I have calculated the projectile forces for the remaining planets and find that the following:

	$\frac{1}{2}g'$	g''	CALCULATED	ACTUAL VARIATION
Mercury	.0825	.484	194403	161036 20 per ct
Venus	.02117	.312	126360	117702 7 per ct
Earth	.01031	.6254	100090	100127 1½ per ct
Mars	.004478	.0524	88570	81166 8 per ct
Jupiter	.000394	.00816	43998	43923 65 feet
Saturn	.000114	.00214	34023	32439 5 per ct
Uranus	.0000028	.000632	23833	22879 4 per ct
Neptune	.000011	.001214	17693	18280 3 per ct

The variation is influenced by the eccentricity and inclination of the planes of revolution as might be expected.

If the foregoing reasoning is correct then comets are an easily solved problem, including the retrograde motion of those comets whose paths lie beyond the orbit of Jupiter.

Were a pendulum to swing 93 inches on one side and 89 inches upon the other, it would be considered a mechanical abnormality, yet Newton's demonstration of the elliptical orbits of the planets, with the sun's attraction at one of the foci would prove that a pendulum could thus swing.

Having thus found in the variation of the force of gravity the origin of Newton's projectile force, we are able to take up the uniform direction of the planetary paths. It will be noticed that the planets rotate orbitally and axially in the same direc-

tion as the sun. It will be also noticed that the satellites revolves in the same direction as the planets, but it will also be noticed that an unrevolving planet is void of satellites. This makes the late observation of Prof. Percival Lowell on the revolution of Venus of great interest to me. The spectroscope can furnish the data for measuring the rate of approach or recession of either side of the sun. The infinitely perfect transmissive power of the ether, that can so shorten or lengthen the light waves as to deflect them upon the physicists screen, can certainly transmit the power waves that would determine the direction of the planetary motion.

III. Misleading in its application.

The materialistic views of Newton in combining matter and force are responsible for many theories and philosophies that have been promulgated since his time. The Nebular hypothesis of Laplace is largely based upon Newton's projectile force. But with that force proven to be due to conditions on the revolving planets the foundation pillars of that theory would be swept away. The materialistic philosophy of the immortal Kant is also based upon Laplaces mechanics, as is also a large proportion of the present ideas of the German scholars, in natural science, philosophy and theology. The most ardent and roseate supporters of Laplace are found among the adherents of the evolutionary theories of Darwin, Wallace and Lamark. With the Nebular theory overthrown, their greatest stay would be removed and the question could then be asked whether the whole tendency of nature is not rather to perpetuate the species than to change to new species.

Having thus given reasons for denying that gravity is a property of matter and endeavored to prove that it is a state of matter dependent upon physical or chemical conditions, we are enabled to search out its origin. That it is intimately associated with heat seems a fair supposition.

Heat is not gravity however. Heat is a repulsive force and gravity an attractive force. Heat represents a push between bodies; gravity a pull or suction.

Newton in his "Optical Queries" shows that if the pressure of the ether is less in the neighborhood of dense bodies than at a great distance from them, dense bodies will be driven toward each other, and that if the diminution of pressure is inversely as the distance from the dense body, the law of force will be the inverse square law of gravitation.

Newton's theory has grandly served the purpose for which it was intended by its noble author, namely, Principia (Davis Edition) Vol. 1, p. 5. "For I here design only to give a mathematical notion of those forces without considering their physical causes and seats." "Considering those forces not physically, but mathematically." "I attribute forces, in a true and physical sense to certain centers (which are only mathematical points.)

Newton was a man of too much mental grasp to leave anything remain to be elaborated after he once mastered the principal and it is almost humorous to notice what provisos and safe guards he placed around his favorite theory.

Ancestor worship will not solve present day problems. The same problems remain unsolved today that were unsolved in Newton's time, except those that did not rely upon Newton's theories for their solution. A basic theory of the character of Newton's should solve mathematically the inclination of the ecliptics, eccentricity of the orbits, nutation, cometary motions, solar heat, barometric pressure, planetary motions, in fact the whole unity of nature, but it fails.

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Apr. 27, 1910.